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A STATISTICAL ANALYSIS OF DATA USED IN CRITICAL DECISION MAKING BY SECONDARY SCHOOL PERSONNEL.

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Descriptors-*ACADEMIC ACHIEVEMENT, *DECISION MAKING SKILLS, EVALUATION TECHNIQUES, FACTOR ANALYSIS, GRADING, PERSONALITY, SECONDARY SCHOOL STUDENTS, *SOCIAL CHARACTERISTICS, STANDARDIZED TESTS, *STATISTICAL ANALYSIS, TEACHER ATTITUDES, TEST VALIDITY

Guidance decisions depend on the validity of standardized tests and teacher judgment records as measures of student achievement. To test this validity, a sample of 400 high school juniors, randomly selected from two large Gulf Coas t area schools, were administered the Iowa Tests of Educational Development. The nine subtest scores and each student's first semester grades (including two grades for nine-week periods, the semester examination score, and the semester average) in English, American History, and Biology were factor analyzed. The factors clustered among themselves, but separated from one another. Some 40 student traits or characteristics were rated on a five-point desirability scale by 100 classroom teachers, administrators, and other faculty. The 40 traits were tested for relationship and frequency ratings. Teachers tended to select factors showing high degrees of personal adequacy (including conscientious, industrious, alert, reliable, open-minded, thorough, and efficient). The factor analysis did not reveal many characteristics apparently significant in academic achievement in different disciplines . Rather, the variables seemed to associate with highly valued social characteristics often identified as middle-class values. (Author/WR)

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A Statistical Analysis of Data Used in Critical Decision Making by Secondary School Personnel

Charleta J. Dunn

Gerald T. Kowitz

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A Statistical Analysis of Data Used in Critical Decision Making by Secondary School Personnel

Cooperative Research Project No. 320

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May, 1967

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A STATISTICAL ANALYSIS OF DATA USED IN CRITICAL DECISION MAKING BY SECONDARY SCHOOL PERSONNEL

Abstract

A sample of 400 senior high juniors randomly selected from two large Gulf Coast area schools were administered the Iowa Tests of Educational Development. The nine subtest scores in addition to each student's first semester grades (which included two nine-week periods, the semester examination score, and the semester average) in English, American history, and biology were factor analyzed.

Forty student traits or characteristics were rated on a five-point desirability scale by 100 classroom teachers, administrators, and other faculty. The forty traits were tested for relationship and frequency ratings.

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This investigation was made possible through the cooperative efforts of the Hogg Foundation for Mental Health, Austin, Texas; South Park Independent School District, Beaumont, Texas; and the Bureau of Education Research and Services, College of Education, University of Houston, Houston, Texas.

The author of this report was appointed project director in August, 1966, and directed during the academic year of 1966-1967 the gathering and analysis of research data.

Dr. Gerald T. Kowitz, Professor of Education, University of Oklahoma, as co-author and consultant made important contributions to the guidelines used for the study and the development of the manuscript. Dr. Billy N. Pope, Director of Curriculum Development, South Park Independent School District, gave suggestions and support to the collection of data. Mr. David Shaw, Assistant Professor, Alvin Junior College, programmed and supervised the data analysis. Mr. Bill F. Payne, Division of Guidance, Texas Education Agency, Houston, read the report and assisted in the interpretation and development of the materials.

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Charleta J. Dunn
Project Director

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PART I

THE PROBLEM AND DISCUSSION

Purpose

Guidance work at the secondary level can be viewed essentially as a series of decisions concerning student placement and educational planning. Critical decisions which affect educational expectation and social adjustment are currently based primarily upon academic records composed of student grades and scores made on standardized tests. Results from these tests have been utilized for prediction of future academic success, planning, placement, and as an aid to increase the self-understanding of the individual.

Present emphasis upon scholastic achievement and test results have intensified the consequences and, therefore, the tensions associated with student evaluation and prediction; for example, school personnel may require a student to take certain courses and deny him the privilege of enrolling in others. In other words, records--grades and test scores--affect the critical decisions, and, subsequently, determine the student's adjustment, performance, morale, and self-concept. Invariably, these

decisions enhance or deflate the self-image. In particular instances negative results are perceived in student growth and development and mental health.

The increase in personality disorders among students and the constant focus upon emotional stability have indicated that the mental health of youth has been a sorely neglected field in the public school. More recognition of the forces and factors that impair mental health as well as those that maintain or improve it and more understanding of how the personality develops and the situations and forces that cause it to deviate are needed.

Studies have suggested that (1) the low achieving student may be distinguished by the negative social impact of his behavior and his comparative inability to perceive the attitudes of others,[1] (2) negative images of self and

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[1] H. O. Barret, "An Intensive Study of Thirty-two Gifted Children," Personnel and Guidance Journal, 36 (1957), pp. 192-194; L. K. Cass, "Parent-Child Relationships and Delinquency," Journal of Abnormal Social Psychology, 47 (1953), pp. 101-104; A. B. Clark, III, and Leonard J. Gregorio, "Graduate School Admissions Policies and the Counseling Use of the SVIB Student Personnel Scale," Teachers Journal of College Student Personnel, 7:3 (May, 1966), pp. 176-179; S. B. Chorost, "Parent Child-Rearing Attitudes and Their Correlates in Adolescent Hostility," Genetic Psychology Monograph, 66:1 (1962), pp. 49-60; A. O.

group affect motivation, aspiration, and achievement of academic and behavior skills needed for satisfactory functioning through life,[2] and (3) teacher perceptions of social behavior insofar as differential value is attached to specific behaviors may have some relationship to student achievement.[3]

The adequacy and the usefulness of guidance decisions in public schools depend upon criteria established. The counselor who handles problems of educational planning

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Haller and C. E. Butterworth, "Peer Influences on Levels of Occupational and Educational Aspirations," Social Forces, 38 (1960), p. 295; and R. G. Williamson and Charles Cole, "Factors in Scholastic Performance: The Behavior Differential," Personnel and Guidance Journal, XLIV:9 (May, 1966), pp. 962-966.

[2]Benjamin S. Bloom, Stability and Change in Human Characteristics (New York: John Wiley and Sons, 1964), pp. 124, 127; Virgil A. Cliff, "What Can Education Do?" Education Forum, 30:2 (January, 1966), pp. 147-151; Robert J. Havighurst and Others, Growing Up In River City (New York: John Wiley and Sons, 1962), pp. 36-161; George E. Leonard, "Theoretical Understanding," presented at National Convention, Dallas Convention Abstracts (Washington, D. C.: American Personnel and Guidance Association, 1967), pp. 161-162; and E. H. Shelden, "Self-Perception: A Study of Delinquent Boys," Guidelines For Guidance (Dubuque, Iowa: William C. Brown Company, 1966), pp. 99-106.

[3]G. Allport, Pattern and Growth in Personality (New York: Holt, Rinehart, and Winston, 1961); R. R.

by considering grades without having a knowledge of the measures, observations, or indicators of quality used in grading or rating student work is basing critical decisions on criteria that are at best of unknown reliability and validity. The school's responsibility for the emotional, social, and educational consequences becomes grave indeed when such decisions have been based upon invalid records, erroneous interpretations of grades or scores, and standards that have not been investigated.[4]

The decisions have been defended on grounds that the scores and grades indicate the achievement and the ability of a student in particular subject matter areas. If class grades and teacher-made tests are valid measures of academic achievement in a specific discipline, a high correlation exists between such indicators and achievement

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Carkhuff and C. B. Truax, "Toward Explaining Success and Failure in Interpersonal Learning Experiences," Personnel and Guidance Journal, 44:7 (March, 1966), pp. 723-728; Junius A. Davis, Faculty Perceptions of Students (Princeton, New Jersey: Research and Development Report, Bulletin No. RB-66-28, June, 1966); and Shlomo Shoham and Meir Hovev, "Social Factors, Aspects of Treatment, and Patterns of Criminal Career Among the B'nei-Tovim," Human Relations, 19 (1966), pp. 47-56.

[4]Hillel Black, They Shall Not Pass (New York: William Morrow and Company, 1963).

battery subtest scores. In other words, if these criteria do not show high loading with one another on common factors when factor analyzed, serious questions arise about the wisdom of basing educational placement upon such data.

Background

To justify the uses of achievement test batteries as one basis for making intelligent provisions for individual needs through intra-class grouping, individualized instruction, differential assignments, and in establishing groups for instruction that are homogeneous in respect to scores on these tests,[5] it is necessary to show that the subtests do provide information unique to a particular discipline. When a factor analysis of subtest scores provides such evidence, this element is said to represent the specific construct of achievement.

The Iowa Tests of Educational Development achievement test battery has become one of the most widely used

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[5]J. Wayne Wrightstone, "The Relation of Testing Programs to Teaching and Learning," in Warren G. Findley (Ed.) The Impact and Improvement of School Testing Programs, Sixty-second Yearbook, National Council for the Study of Education, Part II (Chicago: University of Chicago Press, 1963), pp. 45-46.

achievement test batteries[6] and has been suggested as an excellent instrument to use in an exploration for evidence of construct validity.[7]

Research derived from quantitative estimates of feelings and attitudes further complicate the measurement in human and behavioral sciences. The problem of converting a series of qualitative facts (opinions, impressions, convictions, attitudes, interests, etc.), into a quantitative series has been one of the most perplexing problems of researchers.[8]

In the behavioral sciences the identification of standard units has been difficult and measurement of them is subject to conditions likely to cause variations. Thus, it has been necessary to develop psychological

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[6]Oscar K. Buros, The Sixth Mental Measurements Yearbook (Highland Park, New Jersey: The Gryphon Press, 1965), p. 51.

[7]William B. Michael, "Problems of Validity for Achievement Tests," Eighteenth Yearbook, National Council on Measurements in Education (Ames, Iowa: The Council, 1961), pp. 6-7.

[8]Francis J. Rummel, An Introduction to Research Procedures in Education, Second Edition (New York: Harper and Brothers, 1964), pp. 198-199.

methods for determining scale values that are scientifically usable.[9]

Rationale

The design of the study was derived in part from the history of the intelligence test movement which shows a gradual drift from content validity to a correlation based estimate of concurrent validity and, more recently, to construct validity through the use of factor analysis. Because the factor analysis approach has shown promise in the study of mental ability, intelligence testing and achievement testing, the present investigation utilized the approach in exploring the validity of teacher grades and test scores.

To provide evidence of construct validity, it was necessary for four factors to emerge from the test and grade matrices--a general factor (all tests, achievement subtests as well as teacher-made tests, involved reading) followed by three other factors having clusters of items related to the subject matter areas of English, American history, and biology. Therefore, a statistical analysis was made of the subtest scores, teacher grades, and test

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[9] Ibid., p. 221.

scores to determine whether they provided independent estimates of student achievement.

The rating technique was an attempt to transform a series of qualitative facts into a series of quantitative facts, or variables, so that processes of measurement and statistical analysis could be applied. By relating these estimates to the subtest scores and other data, an analysis, it was believed, would indicate the way each loaded with the other and serve as an evaluation of the potency of the several independent evaluations of student achievement. The hypothesis for the study was that achievement battery subtest scores, teacher grades, and teacher test scores in three academic courses would not provide significant, independent estimates of student achievement.

Procedure

Being aware that teachers' grades are not an adequate basis for predicting scores made on achievement subtests and being suspicious that socialization is an important factor in grades given, a series of scales was composed for study. In developing the list of stimulus variables, statements and studies in reference to the

relationships found in the literature between affective factors in high school achievement were sought and included so that some insight might be gained as to the educator's perception of his interpretation of records, his personal value system, and his role as a classroom teacher. (See Appendix A). Those non-intellectual factors reviewed for the purpose of this investigation were limited to the relationship between academic achievement and affective elements concerning socialization, i.e., personal characteristics deemed important by secondary school teachers.

Sample

One of the goals of the project was to consider the uniqueness of the local curriculum and the standards and procedures for assigning pupil grades; therefore, the data were gathered within one school system. Had several school districts been used, the significant local curriculum regulations would have been confounded.

The school district that cooperated in the study covers 135 square miles, has a fairly representative cross-section of socio-economic groups, and provides more than minimum support for education. The district was considered

representative of large urban school districts in the Gulf Coast Area of Texas; generalizations to other schools should be made with caution.

The eleventh grade was selected to accentuate the impact of local regulations. Tenth graders were new to the high school operations, and seniors often present a biased picture because of those activities pertaining to graduation and the anticipation of post-high school plans. The population, from which a random sample of 400 was drawn, totaled 1046 eleventh grade students.

Data

In January, 1967, each of the 100 participating teachers responded to a special rating scale designed to estimate the value of specific characteristics or traits believed to relate to academic success at the secondary level. Because of school board policies, it was not possible to identify students; consequently, teachers rated students generally, which revealed social, not academic, phenomenon.

The Iowa Tests of Educational Development (ITED) were administered in October, 1966; teacher grades from two nine-weeks first semester sessions, the semester examination score, and the semester average were collected

in February, 1967, from those student records of the population chosen. (See Appendix B).

The data gathered have been presented into two sections. Part I involves an analysis of three assessments of student progress: (1) student achievement tests, (2) teacher-made tests, and (3) student grades; Part II concerns the exploration of some factors correlated with academic expectation.

PART II

DATA ANALYSIS

The data were processed on the 7094 IBM Computer through the facilities of the University of Houston Computer Center. The specific routine taken from the University of Michigan's Executive system was the principal axes factor analysis and varimax rotation (UMPAFA). This routine provided means and standard deviations for the variables, a table of intercorrelation among all variables, a table of eigenvalues for a total of one-half the number of variables entered in the matrix and a varimax rotation of the factors to approach a configuration of simple structure.

Two options were available which could affect the factor process. Either 1.00 or the squared multiple correlations (SMC) could be inserted in the diagonal of the intercorrelation matrix. Considering the recommendations of Harman[1], the choice was made to use the SMC in the diagonal. As will be pointed out later, in one analysis the 1.00 value was used to estimate the communalities of variables because it provided what seemed to

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[1] H. H. Harman, Modern Factor Analysis, Second Edition (Chicago: University of Chicago Press, 1962).

be a more interpretable reduction of data.

Means and Standard Deviations

The means and standard deviations for the subtests on the Iowa Tests of Educational Development (ITED), Table I, reveal a fairly uniform picture. The means ranged from the low of 15.93 to the high of 17.46, a difference of 1.53. The standard deviations ranged from the low of 4.84 to the high of 6.44, a difference of 1.60. A review of the standard scores established in 1963 reveals the means to be

TABLE I

Means and Standard Deviations of Subtest Scores

	ITED Subtests	Scores Mean	SD
Variables	Background Social Studies	15.93	5.51
	Background Natural Sciences	17.52	5.40
	Correctness of Expression	16.87	4.84
	Quantitative Thinking	17.45	5.80
	Reading Social Studies	16.62	6.22
	Reading Sciences	16.32	5.63
	Reading Literature	16.59	5.78
	Vocabulary	17.46	5.78
	Reference Uses	17.23	6.44

above the national norms by approximately 1.56.

Table II presents the means and standard deviations for the grades assigned by the teachers in the three subject matter areas.

TABLE II

Means and Standard Deviations of Teacher Grades and Tests

Variables		Teacher Grades and Test Scores	Mean	SD
	Biology	First nine-weeks grade	77.99	7.99
		Second nine-weeks grade	78.38	8.23
		Semester examination score	77.05	14.03
		First semester average	78.48	8.04
	English	First nine-weeks grade	78.14	6.90
		Second nine-weeks grade	78.21	7.11
		Semester examination score	77.04	11.63
		First semester average	78.28	6.73
	American History	First nine-weeks grade	78.67	7.95
		Second nine-weeks grade	78.46	8.54
		Semester Examination score	77.66	13.90
		First semester average	78.79	8.39

The interpretation of these data is complicated by the absence of norms for the assignment of grades; however, as can be observed from the table, the distance between the average assigned grade, in the high seventies (77.04-78.79), is between two and three standard deviations from the presumed maximum of 100. Thus, approximately normal distributions of grades and test scores are a reasonable expectation for this school district. The data thus seem to support the usual assumptions made about the assignment of grades by teachers.

It should be noted that the means of final examination grades are lower and standard deviations are higher than either the nine-weeks or semester average grades. The higher standard deviations observed for the examination scores are not surprising because nine-weeks grades are typically the result of more observations. The relationship between the number of observations and reliability is a function of the Spearman-Brown formula.

Another possible explanation for this variation would be that the teachers use a wider scale in grading examinations than they do in assigning grades. It is

conceivable, for example, that grades on examination might be in the 30's and 40's and, perhaps, even zero. In assigning nine-weeks grades, however, the weight of other performances and/or school policies regarding retention would be considered and the scale probably never has a great a range. In other words, the lower numbers which could appear in the test score distribution seldom, if ever, appear in the official grades for a nine-weeks period or for the final course average.

Correlational Studies

While the table of intercorrelations resulting from this run are contained in Appendix C, Table III presents the intercorrelations among the ITED subtests. Correlation coefficients of the nine subtest scores ranged from .46 (general background in natural science and correctness of expression) to .79 (interpretation of literary materials and vocabulary). The substantial intercorrelations indicate that a strong general factor is operating in student achievement.

TABLE III

Correlation Coefficients of Subtest Scores

	1	2	3	4	5	6	7	8	9*
1. Social Studies		74	62	65	72	71	70	76	78
2. Natural Science			46	60	60	65	60	64	63
3. Correctness of Expression				58	66	64	70	70	73
4. Quantitative Thinking					58	64	60	58	69
5. Reading Social Studies						75	76	72	72
6. Reading Sciences							74	73	73
7. Reading Literature								79	76
8. Vocabulary									78
9. Reference Uses									

*Decimals have been omitted

Table IV provides the intercorrelations among the grades and teacher-made test scores in the three subject matter fields. Again, the correlations presented are substantial. It should be noted that the highest correlations

TABLE IV

Correlation Coefficients of Teacher Grades and Test Scores in Biology, English, and American History

		Biology				English				American History*			
Biology	9-weeks grade	77	60	85		63	65	52	69	62	56	46	60
	9-weeks grade		72	95		63	68	56	71	49	59	49	62
	Examination			83		50	53	51	58	65	47	43	50
	Average					66	70	60	75	62	61	51	65
English	9-weeks grade					72	54	83		62	56	46	61
	9-weeks grade						66	93		74	66	52	70
	Examination							78		61	55	46	59
	Average									77	69	55	74
American History	9-weeks grade										81	68	89
	9-weeks grade											77	96
	Examination												85
	Average												

*Decimals have been omitted

are achieved within the subject matter areas with the semester average grade. Since the semester average presumably represents a general evaluation containing a number of assessments, among them the two nine-weeks grades and the final examination, its correlation with each of these scores should be the highest in the table. Examination of the table supports this assumption.

A first appraisal of the likelihood that one of the factors measured by the grades represents a general ability or skill in a general academic medium can also be obtained from the table; in other words, if it is expected that the several measures are representing aspects of a common factor, such as a language factor, the intercorrelations between subject fields would be high. For example, the correlations between one--either biology or American history--and English should be next highest, while the correlations between biology and history should be the lowest. This expectation is clearly supported by the data in this table: the correlation coefficient between biology and English semester grades was .75; English and American history, .74; and biology and American history, .65. While not as marked as might be expected, the higher correlation suggests a language factor.

Table V presents the intercorrelations among the ITED subtests scores pertaining to social studies and student grades in American history.

TABLE V

Correlation Coefficients of ITED Subtests in Social Studies and Grades in American History

American History Grades	Test 1 General Background Social Studies	Test 5 Readings in Social Studies*
First nine-weeks grade	51	38
Second nine-weeks grade	50	32
Semester Examination	45	26
Semester average	53	35

*Decimals have been omitted

Subtest one which measures understanding of basic social concepts, should correlate with the subject matter found in the American history curriculum. The highest correlation of coefficient between these two was only .53, however. Subtest five, which measures the ability to interpret reading materials in social studies, and the semester grades in American history ranged from a low .26 to .38.

Providing the intercorrelations among the subtests scores involving the natural sciences and grades earned in biology, Table VI is composed of subtests two and six.

TABLE VI

Correlation Coefficients of ITED Subtests in Natural Sciences and Grades in Biology

Biology Grades	Test 2 General Background Natural Sciences	Test 6 Readings in Natural Sciences*
First nine-weeks grade	46	35
Second nine-weeks grade	48	36
Semester Examination	43	28
Semester Average	51	37

*Decimals have been omitted

Once again low correlations are found. Subtest two, which measures background in the natural sciences, and subtest six, which measures the ability to interpret reading materials in natural sciences, has a correlation of .51 and .37, respectfully, with biology semester average grades.

TABLE VII

Correlation Coefficients of ITED Subtests in Reading-Language Factors and Grades in English

	Subtests					
English Grades	Test 3 Correctness of Expression	Test 5 Readings in Social Studies	Test 6 Readings in Natural Sciences	Test 7 Readings in Literature	Test 8 Vocabulary	Test 9 General Use of Sources*
9-weeks grade	19	27	32	25	30	22
9-weeks grade	24	31	36	31	36	28
Examination	24	31	33	26	32	25
Average	26	34	37	32	37	28

*Decimals have been omitted

Subtest three which measures correctness of expression (punctuation, usage, capitalization, spelling, diction, phraseology, and organization) has a correlation of .26 with English semester average grades. (See Table VII). Subtest seven, the ability to interpret literary materials, showed a correlation of .32 with the semester average grades. Subtest eight, vocabulary, had a correlation of .37, and subtest nine, use of reference sources, had a correlation of .28 with English grades.

Worthy of note are the lower correlations found among these subtests as compared to the intercorrelations of English grades to subtests five, readings in social studies, and six, readings in the natural sciences.

In general, the tables of intercorrelation bear out the expectations. The correlations within a subject field were higher than the correlations between fields. Generally speaking, the correlations between English and the other fields were higher than those between biology and American history.

It is interesting to note that in biology and history, the correlations between subtest scores and teacher grades are higher than the correlations between the standardized scores and teacher final examinations. This could suggest that in the grading process, the teacher considered the standardized test scores--or, at least, the same factors as the tests measure--while the final examination was loaded with material unique to the local curriculum. Another possibility is that the structure of the teacher's examination was such that the lowered coefficients are only statistical artifacts.

Factor Analysis

The first factor analysis was performed using the ITED nine subtests, the grades, and the teacher-made test scores. A total of 21 factors was submitted to the procedure and squared multiple correlations (SMC) were used to estimate the communalities of variables. Table VIII provides the results of the principal factors indicated by principle axes factor analysis and varimax rotation, and Figures I, II, III, IV, V, and VI plot the extracted factors graphically.

TABLE VIII

Principal Axes Factor Analysis and Varimax Rotation for ITED Subtest Scores and Teacher Grades in Biology, English, and American History

	Variables	Varimax Rotation Factors* 1	2	3	4	$\Sigma x^2 f$
ITED Subtests	1	15	-79	-32	-11	82
	2	36	-66	-15	-11	71
	3	05	-77	-16	-06	65
	4	13	-71	-09	-07	58
	5	10	-82	-11	-14	73
	6	18	-80	-13	-15	72
	7	11	-85	-16	-09	78
	8	14	-83	-19	-13	77
	9	08	-88	-13	-07	81
Biology	10	71	-17	-30	-31	79
	11	84	-17	-29	-27	90
	12	76	-10	-23	-18	79
	13	90	-16	-30	-28	1.00
English	14	42	-12	-31	-64	78
	15	40	-16	-39	-74	90
	16	35	-16	-33	-52	73
	17	43	-16	-40	-78	99
American History	18	33	-24	-69	-41	82
	19	28	-20	-84	-26	90
	20	24	-18	-80	-12	78
	21	30	-21	-88	-29	1.00
Total Contribution		3.81	5.99	3.69	2.55	16.95**
% of Total Communality		22.46	35.33	21.76	15.03	-

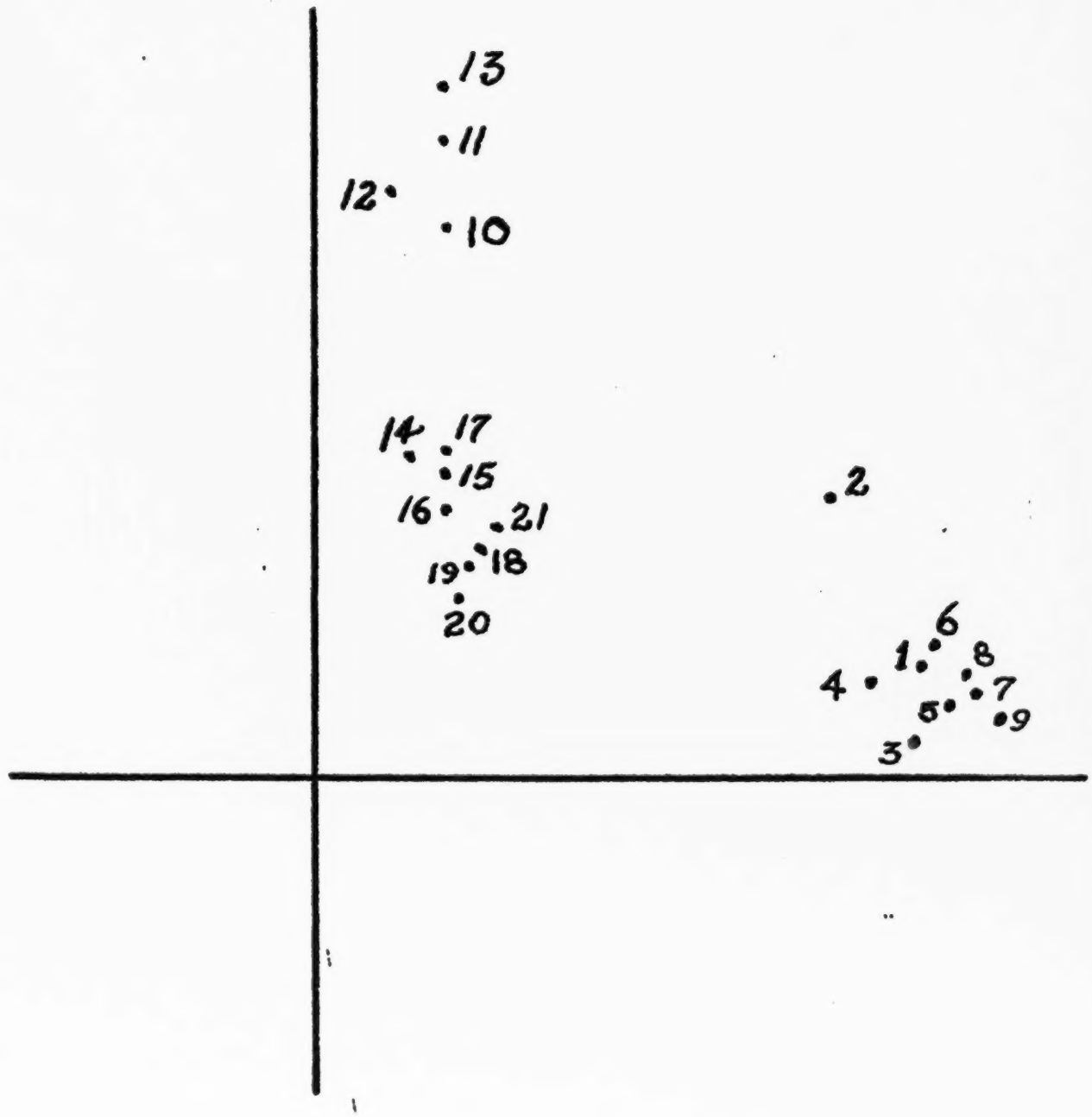
*Decimals have been omitted

**Total Communality

An examination of Table VIII suggests that a simple factor structure was approached in this analysis. The first factor presented in the table accounting for 22.46 percent of the total communality contains primarily the four grades given in biology (See numbers 10-13). The second factor, with 35.33 percent, is primarily composed of the nine ITED subtests (1-9). The third factor, representing 21.76 percent, includes the grades made in American history (18-21); and the fourth factor, with 15.03 percent, contains the grades in English (14-17). The remaining four factors revealed by this process and which were not included in the table account for very small proportions of the communality and do not bear interpretation.

The structure revealed by the factor analysis does not correspond well with usual assumptions. It would seem reasonable that the subtests on the ITED which are designed to measure achievement in language arts would be loaded on the same factor as do the teacher estimates of achievement in English. Similarly, the ITED subtests involving achievement in social studies should relate to grades in American history, and those concerning the natural sciences should relate to teacher estimates of academic attainment in biology.

FIGURE I

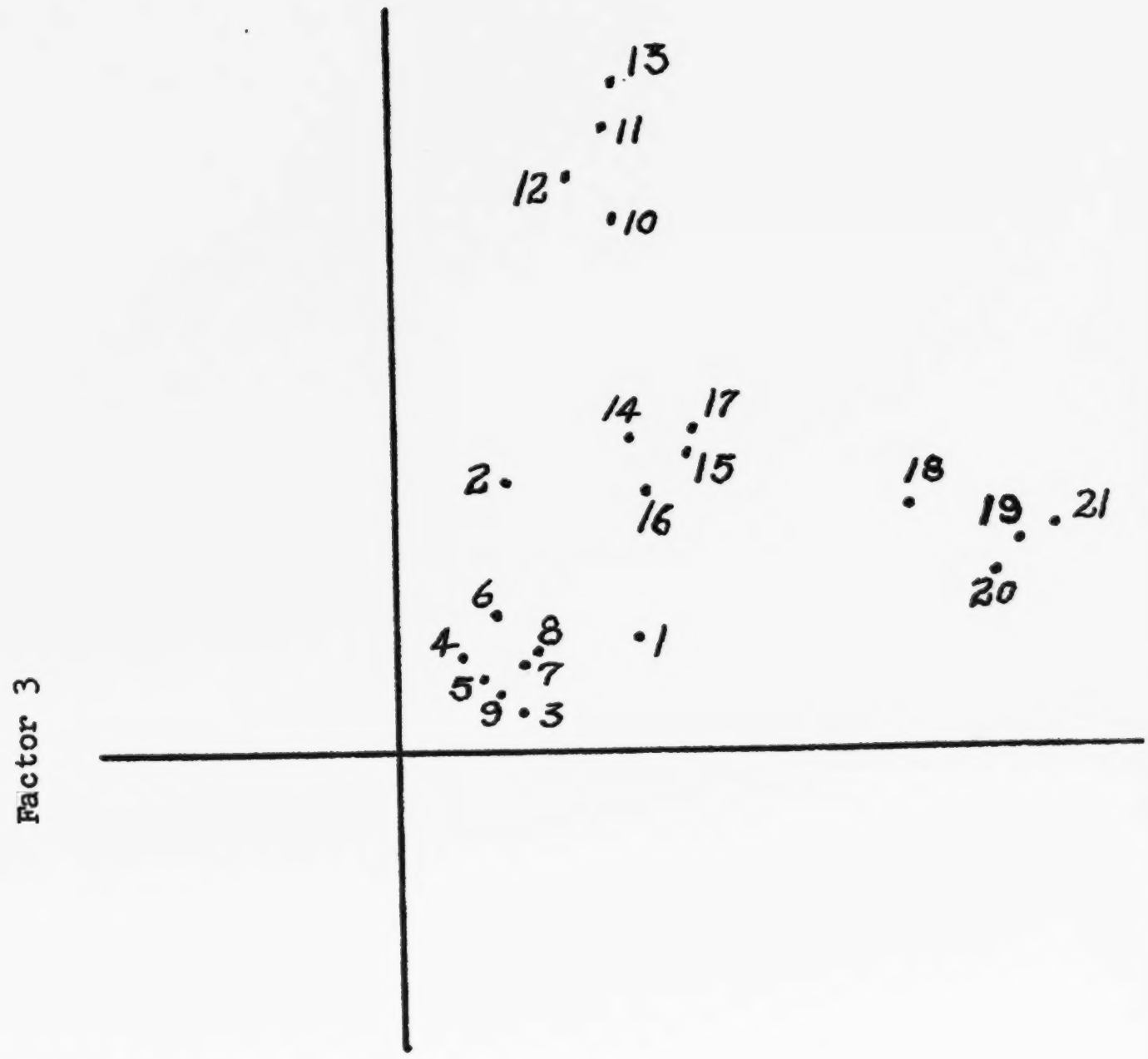


In contrast to this, however, the nine subtests of the ITED apparently reflect somehow a common aspect of assessment which is quite independent from the achievements reflected by teacher grades. An analysis of the factor plotting (See Figure I) reveals this to be a reading-language factor. As was expected, these estimates of student achievement did not cluster with one another, although evaluation by the teacher did associate within the academic fields and each field was represented by a separate factor.

Figure I, which plots the first two factors, accounts for 57.79 percent of the total communality. Factor 2, Table VIII, has been reflected to interpret it more adequately. Most interesting to note is that the ITED subtests cluster with high loadings occurring predominately on factor 2. Teacher grades in English and American history cluster together but separate from the subtest scores as well as the grades made in biology.

Figure II, which accounts for the first and third factors, encompasses 44.26 percent of the total communality. By reflecting factor 3, grades in English and American history are separated, but the clustering among the

FIGURE II



variables remain the same. Subtest two of the ITED, background in the natural sciences, stands alone in both Figures I and II to some degree from the other subtests.

Plotting the first and fourth factors, Figure III accounts for 37.49 percent of the total communality. Factor I can now be substantially identified as heavily loaded along science factors in that grades in biology and subtest two of the ITED load along this line (see Figures I, II, and III). By reflecting factor 4, it is observed that all variables show consistent positive loadings on all factors, indicating a substantial relationship, possibly, a general factor, most logically explained as a reading-language factor.

Accounting for 57.15 percent of the total communality, Figure IV plots factors 2 and 3, which have both been reflected for more adequate interpretation. Once again subtest scores of the ITED are closely clustered with high loadings on factor 2, and subject matter grades along factor 3 as found in Figure II.

Figure V, which graphically portrays factors 2 and 4, accounts for 50.36 percent of the total communality. As found in Figure IV, grades in biology, English, and American

FIGURE III

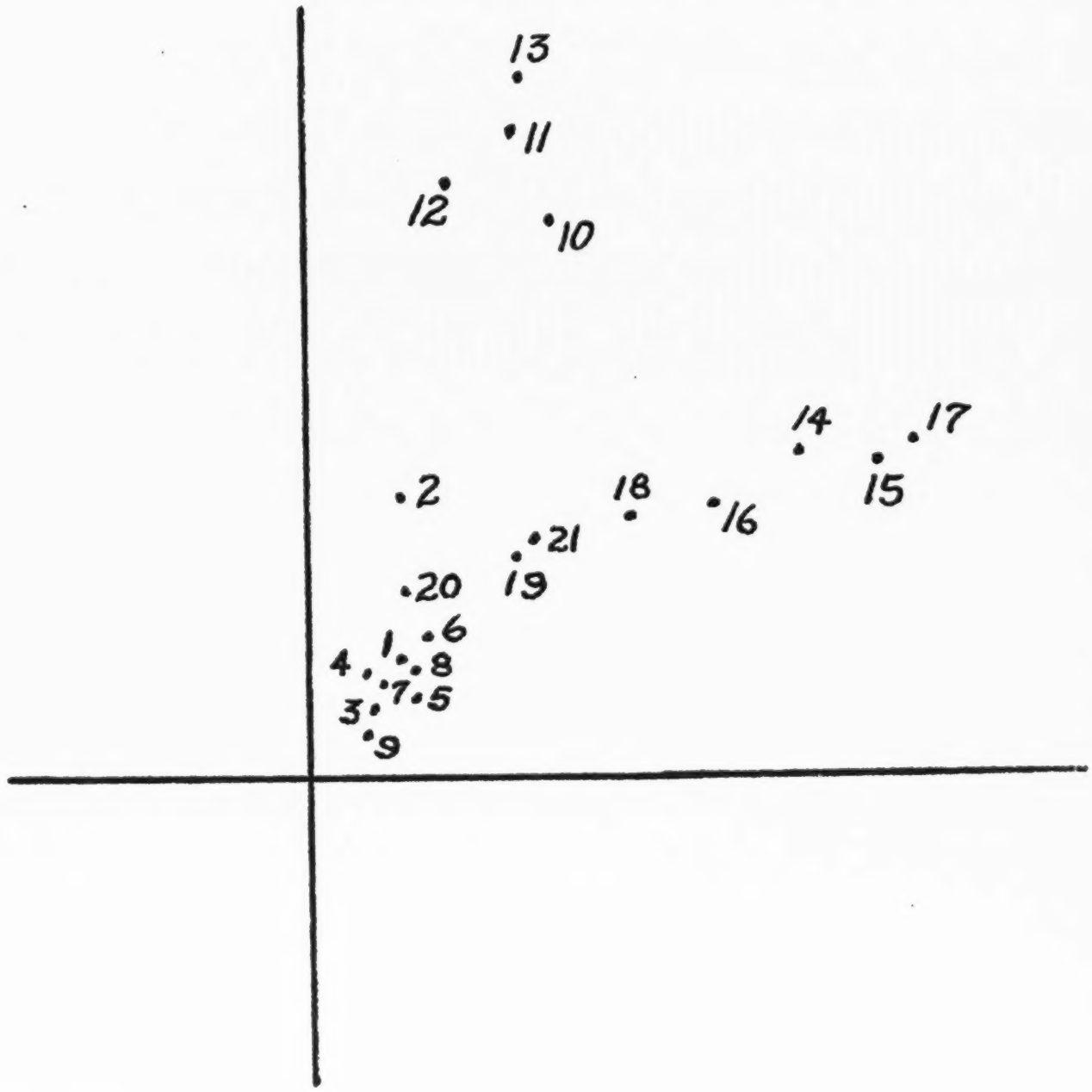


FIGURE IV

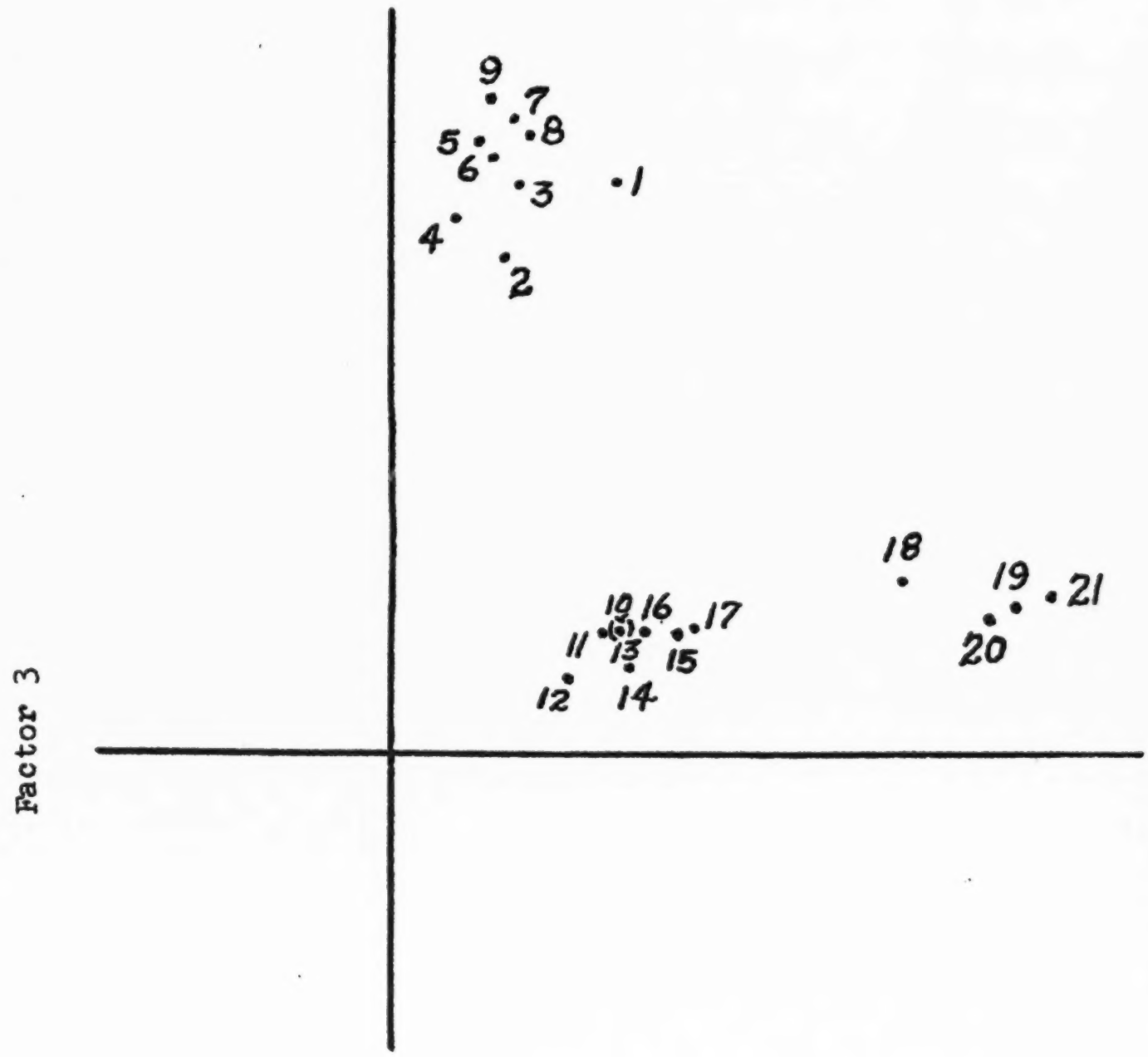
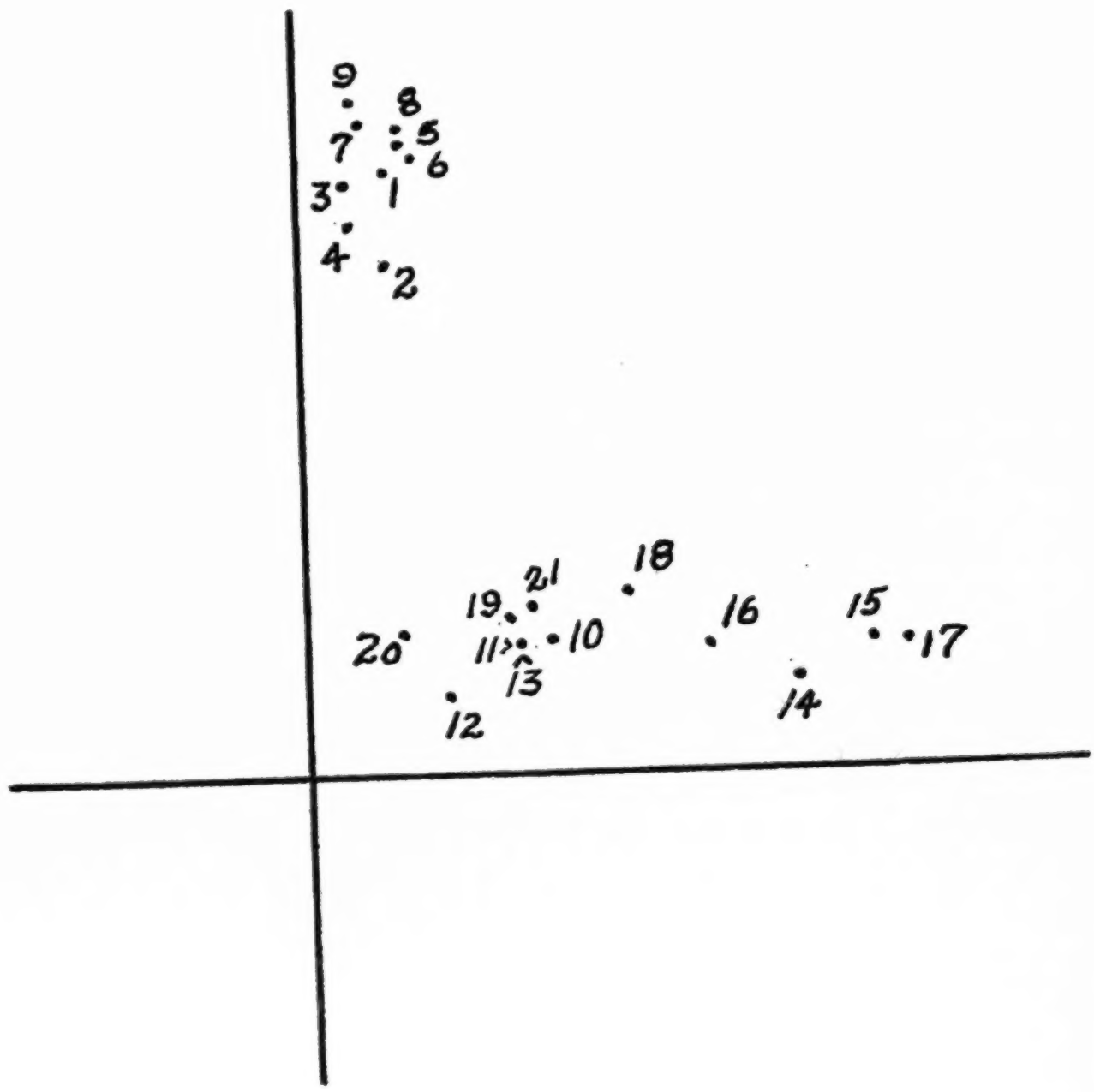


FIGURE V



history have high loadings on the other factor, which does not lend itself immediately to an interpretation.

Figure VI, which plots factors 3 and 4, represents 36.85 percent of the total communality. Both have been reflected for more ease in identification, and a study of factor 3 on all the plots (Figure II, IV, and VI) reveals it to be related with American history grades and test scores. Close analysis of Figures III, V, and VI indicates factor 4 is related to grades in English.

By reducing the number of variables entered into the factor analysis, it is sometimes possible to obtain a different factor structure; therefore, a further exploration was made of the subtests. When the nine subtests of the ITED were factor analyzed, two factors emerged (see Table IX, page 36).

Figure VII, which plots the factors graphically, accounts for almost 99.99 percent of the total communality. Factor 1, which has been reflected for more adequate interpretation, might well be identified as a verbal (reading-language) factor because of the clustering of those subtests (3, 5-9) involving language arts. Loadings on factor 2, but influenced by factor 1, are subtest two, involving

FIGURE VI

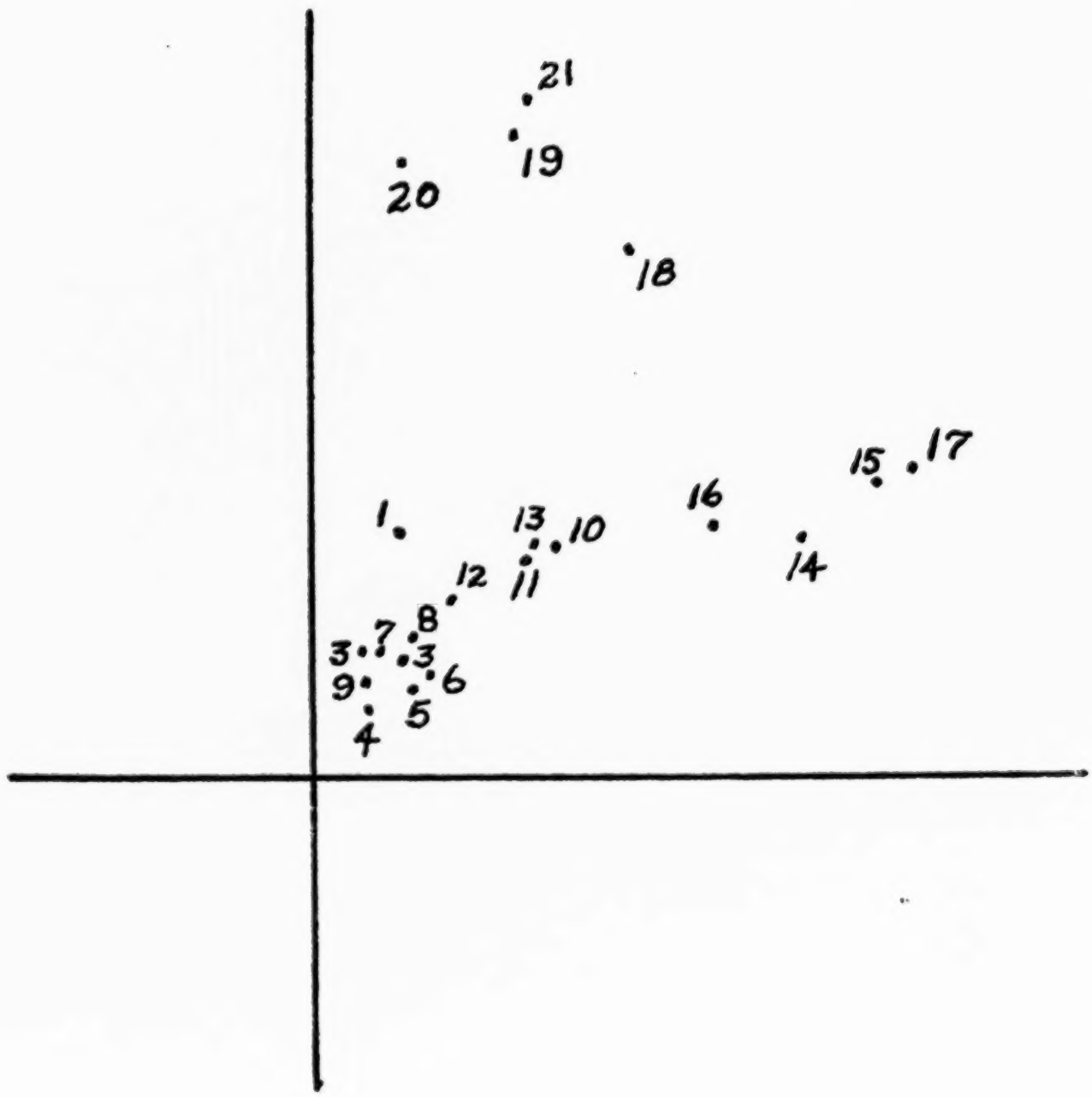


TABLE IX

Common Factor Loadings of ITED Subtests
(Using SMC in the Diagonal)

Variables	Varimax Rotation Factors 1	2*
1. Background in Social Studies	-54	70
2. Background in Natural Sciences	-37	72
3. Correctness of Expression	-75	31
4. Quantitative Thinking	-50	55
5. Reading Social Studies	-68	49
6. Reading Natural Sciences	-64	55
7. Reading Literature	-76	43
8. Vocabulary	-72	49
9. Uses of Sources	-71	53
Total Contribution	3.72	2.66
% of Total Communality	58.30	41.69

*Decimals have been omitted

FIGURE VII

natural sciences; subtest one, involving social studies, and subtest four, involving quantitative thinking.

Instead of the SMC, the second attempt was made by using a 1.00 in the diagonal. The result of this analysis is presented in Table X. As can be seen, four factors now emerge from the nine subtests. These present a rather meaningful picture of the structure of the ITED.

The first factor presenting 30.07 percent of the total communality contains subtest 3, the correctness of expression; subtest 7, reading literature; subtest 8, vocabulary; and subtest 9, use of sources. Taken together, these substantiate that the several tests suggest a factor concerned with command of the language. The second factor, accounting for 26.26 percent of the total communality, is represented by subtest 2, background in natural sciences, and, to a lesser degree, subtest 1, background in social studies. Thus, it would seem that this particular factor represents previous attainments in the sciences. The third factor accounting for 17.76 percent of the total communality, contains only subtest 4, quantitative thinking. The fourth factor, accounting for 25.88 percent of the total communality, presents a pattern composed of subtest 5,

TABLE X

Common Factor Loadings of ITED Subtests
(Using 1.00 in the Diagonal)

	Varimax Rotation Factors*			
Variables	1	2	3	4
1	43	-69	-28	-33
2	14	-85	-30	-28
3	82	-11	-32	-30
4	27	-30	-87	-24
5	38	-32	-23	-76
6	30	-35	-36	-72
7	58	-34	-20	-58
8	65	-50	-13	-41
9	65	-44	-38	-31
Total Contributions	2.37	2.07	1.40	2.04
% of total Communality	30.07	26.26	17.76	25.88

*Decimals have been omitted

readings in social studies; subtest 6, readings in natural sciences; and 7, readings in literature. This pattern would suggest a composite skill on the part of the student and his ability to read and interpret materials regardless of subject matter area.

Using the SMC, the teacher grades and teacher-made test scores were analyzed through a principal axes solution and varimax rotation. Table XI presents the varimax rotation.

TABLE XI

Principal Axes Factor Analysis and Varimax Rotation for Teacher Grades and Tests in Biology, English, and American History

Teacher Grades and Test Scores		Varimax Rotation Factors* 1	2	3	4
Biology	1	70	30	36	-04
	2	85	30	33	-05
	3	72	23	21	-13
	4	89	30	33	-08
English	5	39	30	66	04
	6	37	38	78	-02
	7	32	33	52	-49
	8	39	39	81	-19
American History	9	31	70	45	-09
	10	28	86	29	-07
	11	23	80	16	-06
	12	29	90	33	-06
Total Contribution		3.36	3.50	2.76	.33
% of total Communality		31.93	33.26	26.23	3.13

*Decimals have been omitted

While the differences in a table are discernable, a graphical presentation lends itself more easily to interpretation. Figure VIII (page 43) which plots factors 1 and 2, accounts for 65.19 percent of the total communality. Clearly observable is the fact that grades and teacher-test scores in each subject matter area cluster with themselves.

Figure IX, accounting for 58.15 percent of the total communality, plots factors 1 and 3. Factor 1 can be identified as related to subject matter grades made in biology (see Figures VIII and IX).

Figure X, (page 45) presenting factors 2 and 3, represents 59.48 percent of the total communality. Reference to Figure VIII and IX reveal factor 2 to be that of American history grades. An analysis of factor 3 (see Figure IX and X) indicates it to be related to grades in English.

In each plot, grades in English align themselves with grades in the other subject matter fields more than grades in biology cluster with grades in American history.

Conclusion

The means of final examination grades were lower and the standard deviations were higher than either the

FIGURE VIII

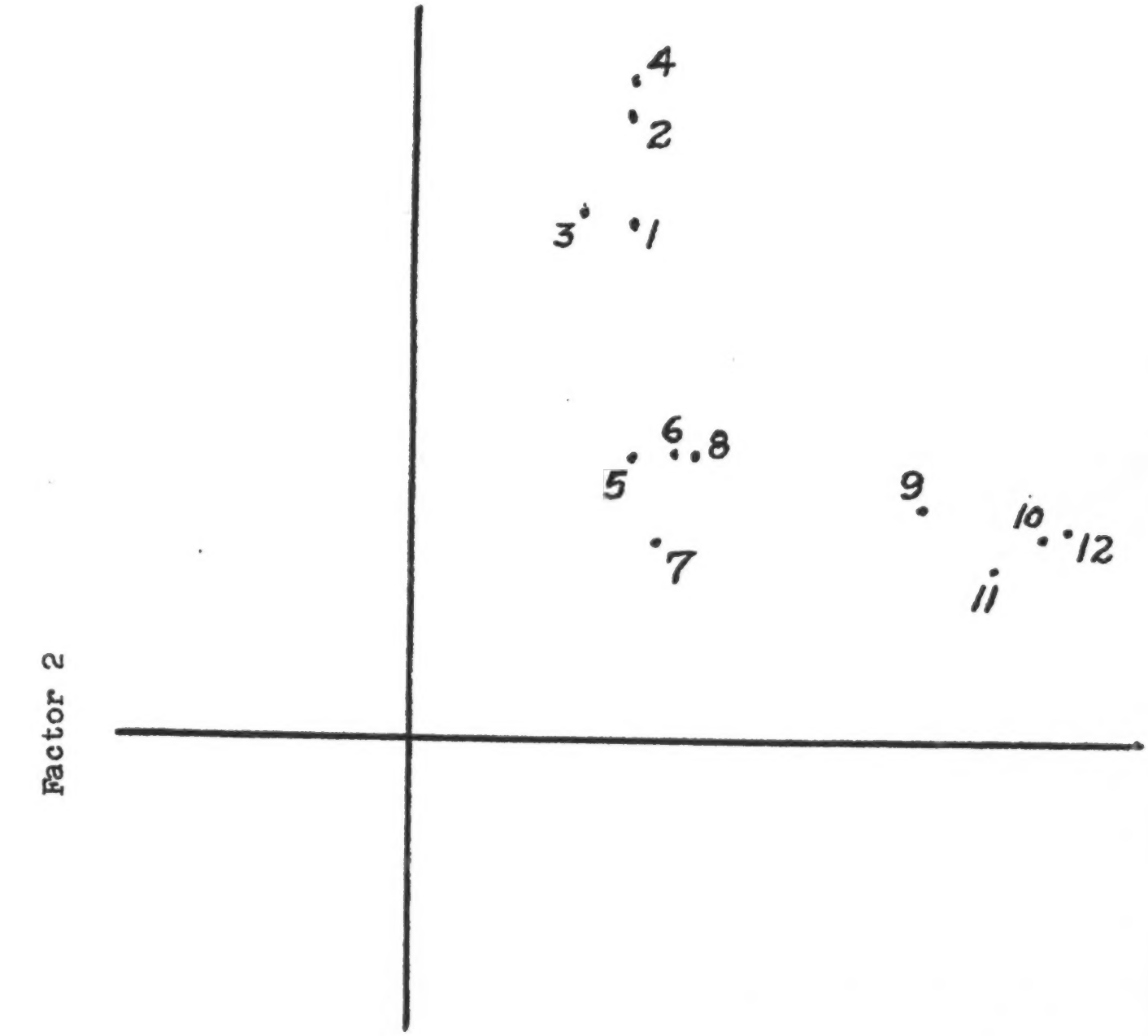


FIGURE IX

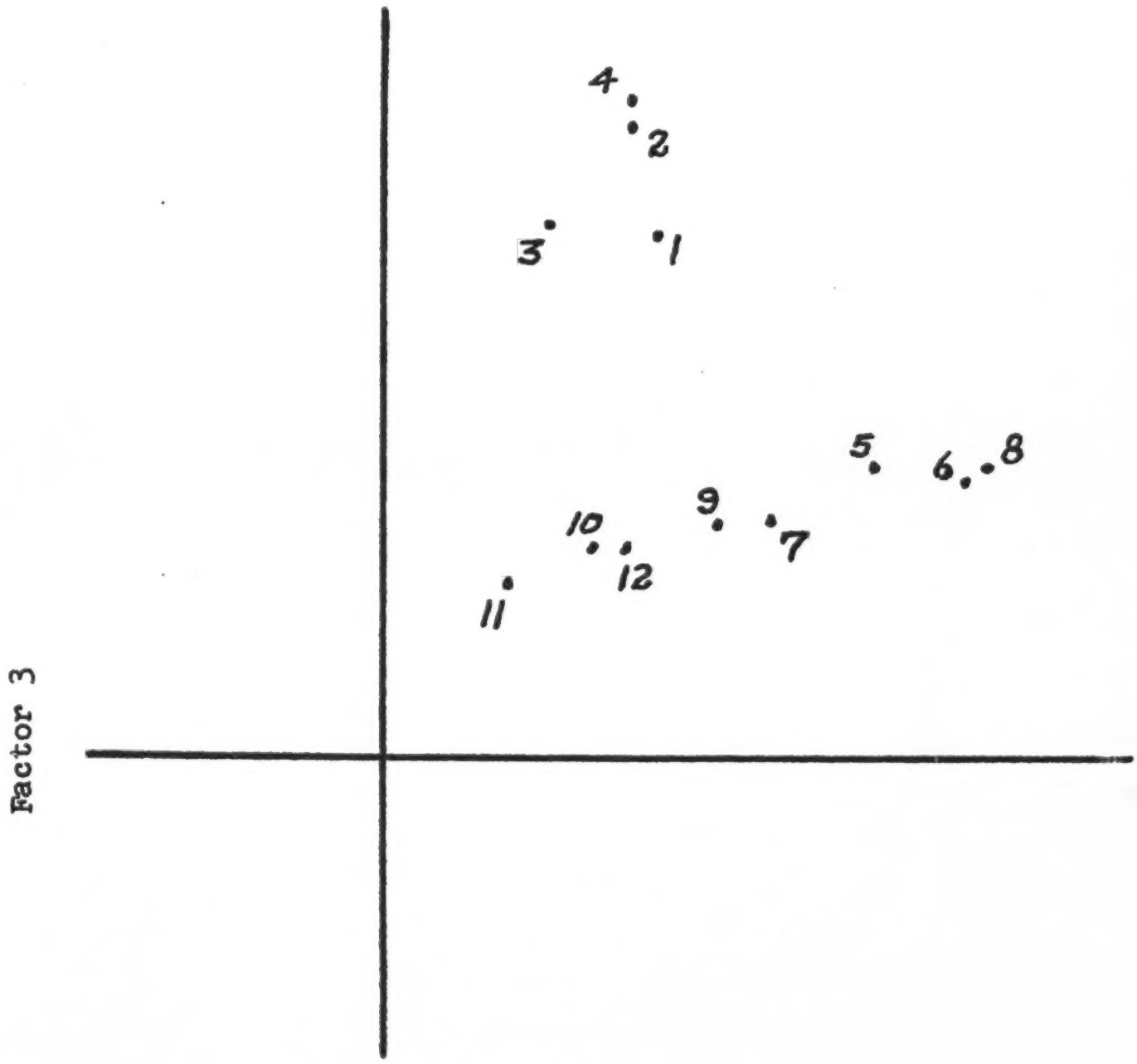
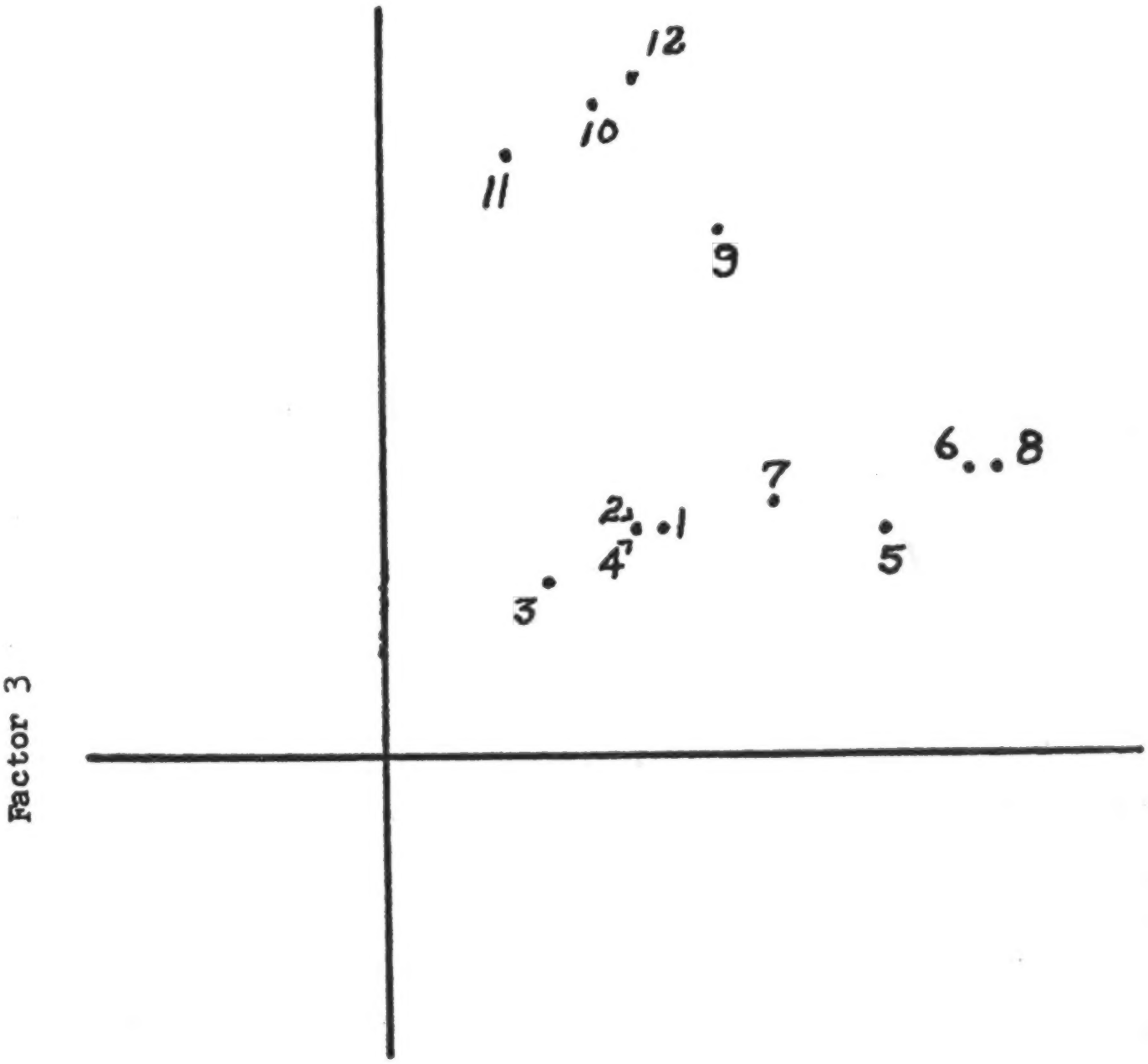


FIGURE X



nine weeks or semester average grades. The higher standard deviations for the examination scores were not surprising because the nine weeks grades are typically the result of more observations. But another explanation, possibly, for the variation would be that teachers use a wider scale in grading examinations than they do in assigning grades.

In general, the intercorrelations bear out the expectations. Among the ITED subtest scores the intercorrelations indicated that a strong general factor was operating in student achievement. The highest correlations of scores were found within a subject matter area; and, as expected, because the several measures represent aspects of a common factor, such as a language factor, the correlation coefficients between English and the other subject matter fields were higher than the correlation coefficients between biology and American history. The correlation coefficients between ITED subtests scores and semester averages were no higher than .53 (subtest 1, general background in social studies and American history semester average).

A factor analysis of the variables studied also revealed a common element (a verbal or language factor) of the ITED subtests which was independent of the achievements reflected by teacher grades and test scores. Factor plotting the percent of total communalities illustrated that the measures did not cluster with one another, although evaluation by the teacher did associate within the academic fields and each field was represented by a separate factor.

At first glance, it would seem from those several analyses that the commonly used indices of student evaluation present the guidance counselor with independent estimates of student achievement. However, a statistical analysis of the several estimates does not provide evidence of the reliability of the data as far as achievement in different subject matter fields including English, biology, and American history. In fact, there is ample basis to interpret all scores investigated as heavily loaded on a verbal factor with no assurance that this is the same factor reflected in the ITED subtests involving the language arts or the English grades earned in the public secondary school.

Great caution must, therefore, be used in interpreting and in using records, both grades and standardized test scores as a basis for critical decisions involving student achievement, student evaluation, and student placement.

PART III

TEACHER PERCEPTIONS OF CORRELATES OF ACADEMIC ACHIEVEMENT

A list of forty adjectives were submitted to 100 teachers with the request that they rate the characteristics or traits on a five-point scale in terms of their significance to student achievement. Table XII presents the stimulus variables in the order of presentation and the means and standard deviation which resulted from the ratings.

Means and Standard Deviations

Generally speaking, the means and standard deviations produced a reasonable picture for this kind of rating system. Several marked discrepancies, however, did appear. Variable 30, the stimulus word "Conscientious," had a remarkably low standard deviation, coupled with a rather high mean value. This indicates very high agreement among teachers on the importance of this trait for student achievement. A similarly small standard deviation can be observed among several other terms, such as variable 37, "Alert," and 30, "Reliable."

At first glance it seems that these have much in common and would be highly desirable for the student; however, the identification of them may represent a statistical artifact.

TABLE XII

Means and Standard Deviations of Characteristics and Rating Traits

	Characteristics	Teacher Mean Value	SD
1.	Polite	3.13	.95
2.	Open-minded	4.16	.88
3.	Considerate	3.10	.95
4.	Friendly	2.40	.90
5.	Agreeable	2.66	.88
6.	Industrious	4.41	.72
7.	Efficient	4.07	.78
8.	Sympathetic	2.06	.86
9.	Insightful	3.82	.92
10.	Purposeful	3.89	.86
11.	Emotionally stable	3.93	.93
12.	Original	3.33	1.01
13.	Sensitive	2.49	.94
14.	Thorough	4.07	.81
15.	Socially accepted	2.27	1.04
16.	Approachable	3.33	.94
17.	Pleasant	2.71	1.00
18.	Poised	2.56	1.00
19.	Healthy	3.58	1.06
20.	Progressive	3.47	1.04
21.	Reliable	4.35	.74
22.	Self-controlled	3.97	.85
23.	Sensible	3.64	.93
24.	Just	3.20	.99
25.	Punctual	3.60	1.03
26.	Kind	2.42	.99
27.	Warm	2.09	.92
28.	Fair	3.41	1.14
29.	Firm	2.98	.88
30.	Conscientious	4.42	.67
31.	Learned	3.46	.96
32.	Flexible	3.91	.87
33.	Thoughtful	3.28	1.07
34.	Humorous	2.39	1.05
35.	Imaginative	3.76	.89
36.	Tolerant	3.38	1.06
37.	Alert	4.36	.68
38.	Cheerful	2.72	1.06
39.	Leadership	3.07	1.16
40.	Appearance	2.87	1.17

The use of a five-point scale forced the standard deviation to be spuriously low. Any time an average rating was greater than four or less than one, a large number of the ratings clustered between that point and the end point on the scale. For example, variable number 2, "Open-minded," which contained a mean value of 4.16, would be expected to have a low standard deviation (It was .88.) because the maximum value could not exceed 5.

Characteristics or traits valued as 4, "Very Important," to 5, "Extremely Important," included the following, given in rank order of mean value: Conscientious, Industrious, Alert, Reliable, Open-minded, Thorough, and Efficient. These are learned behavior patterns which are highly valued in our middle-class value system. Thus, the results provide some understanding of teacher expectations of the antecedents of academic success. It is of interest, perhaps, that very few of the traits received remarkably low ratings. None received a rating of 2.00, defined as "Unimportant," or less.

Correlational Studies

The table of intercorrelations are given in Appendix D. Trait number 26, "Kind," correlated at or above .51 with six characteristics (3-Considerate, 4-Friendly, 8-Sympathetic

17-Pleasant, 24-Just, and 27-Warm). Teacher mean value indicated that the adjective (2.42) was rated slightly higher than 2, defined as "Unimportant" to a student academic success at the secondary levels.

Characteristics number 27, "Warm," correlated at or above .55 with five characteristics (3-Considerate, 4-Friendly, 8-Sympathetic, 17-Pleasant, and 26-Kind). The teacher mean value was 2.09, defined as "Unimportant." "Cheerful," variable number 38, correlated at or above .51 with five traits (3-Considerate, 4-Friendly, 17-Pleasant, 18-Poised, 26-Kind). The mean value rating was 2.72, between "Unimportant" and "Important" to academic success in the public secondary school.

Factor Analysis

Ratings on the forty stimulus variables were subjected to the factor analysis program. Using the procedure of inserting SMC's in the diagonal, the rotation failed to converge after twenty-five iterations, and the process was terminated. A second attempt was made using 1.00 in the diagonal of communality in the correlation matrix. The extraction and rotation routines were successful. The loadings on the twenty extracted factors after rotation are presented in Table XIII.

TABLE XIII

Principal Axes Factor Analysis and Varimax Rotation for Teacher Rating of Student Characteristics or Traits

Varimax Rotation	
Principal Factors	Total Contribution
1	5.12
2	1.41
3	1.98
4	1.39
5	1.18
6	1.25
7	1.77
8	3.05
9	1.30
10	1.31
11	1.24
12	1.34
13	1.83
14	2.08
15	1.17
16	1.52
17	1.68
18	1.33
19	1.22
20	1.33

The five factors with the heaviest loading in the analysis are presented in Table XIV. These factors have been reordered in decreasing value of the percent of communality. (They are shown in the original order in Table XII and Appendix A.)

The heaviest loading (5.12 of the total contribution) found in Table XIV is a factorial one, presenting a combination of eight adjectives. These stimulus variables are numbers 3, "Considerate"; "Friendly"; 5, "Agreeable"; 8, "Sympathetic"; 17, "Pleasant"; 26, "Kind"; 27, "Warm"; and 34, "Humorous." As a pattern they suggest a picture of pleasant human relations.

The second factor, accounting for 3.05 of the total contribution, presents three of the stimulus words: numbers 36, "Tolerant"; 39, "Leadership"; and 40, "Appearance." These three characteristics are currently given high social approval. The third factor, accounting for 2.08 of the total contribution, includes stimulus words numbered 15, "Socially accepted"; 18, "Poised"; and 38, "Cheerful."

The fourth largest factor (1.98 of the total contribution) contains only two of the stimulus words: numbers 12, "Original," and 35, "Imaginative." It is not difficult to perceive the relationship of these two words.

TABLE XIV

Five Factor Loadings of Teacher Rating of Student Characteristics or Traits

	Variables	Varimax Rotation* Factors 1	8	14	3	13
3	Considerate	59	-47	04	-08	29
4	Friendly	61	-34	45	02	27
5	Agreeable	60	-34	01	-14	17
8	Sympathetic	80	12	09	-07	-05
12	Original	-13	05	07	84	01
15	Socially accepted	36	01	75	-05	08
17	Pleasant	60	-23	33	02	29
18	Poised	19	-31	68	-07	-07
22	Self-controlled	11	-09	09	-01	84
24	Just	30	-16	-04	-13	55
26	Kind	73	-25	13	-08	16
27	Warm	77	-25	17	-07	-00
34	Humorous	68	-03	23	12	-09
35	Imaginative	-01	-08	-09	85	-07
36	Tolerant	24	69	-05	-01	20
38	Cheerful	30	-42	56	16	15
39	Leadership	17	78	21	17	-10
40	Appearance	24	59	18	-08	12
Total Contribution		5.12	3.05	2.08	1.98	1.83
% of Total Communality		14.84	8.84	6.02	5.75	5.31

*Decimals have been omitted

The presence of the more reasonable rating accompanied by a somewhat larger standard deviation would permit the item to show a higher correlation than would a markedly skewed distribution with a low standard deviation. Thus, an alternate explanation appears. Teachers may have been in such high agreement on traits such as 6, "Industrious," 30, "Conscientious," and 21, "Reliable," that their ratings did not permit sufficient variation so that reasonable mathematical correlations could exist. Consequently, from a statistical point of view, the rating scale was not wholly satisfactory.

The factor analysis did not reveal many of the characteristics that seemed to be significant in academic achievement. Instead, the variables seemed to associate with social characteristics highly valued currently and identified often as middle-class values. There are several possible explanations for the perceived pattern. Most likely, there is relatively low agreement among teachers concerning the most significant of the characteristics. Thus, while one teacher may value the highly creative student, another may not. There are, of course, some subject matter areas, such as spelling and arithmetic, in which a high level of creativity is not desirable.

In contrast, most teachers would probably agree on certain characteristics which reflect a rather comfortable social climate in the classroom, particularly those that would contribute towards an easy human relationship.

Percentage of Ratings

Table XV presents an analysis of the student characteristics and traits showing the rankings assigned by the teachers. It will be noted that the most popular items receiving a very high rating, those near the top of the table, had the lowest standard deviations. As was explained earlier, this occurs because of the limited rating range. The result is a markedly skewed distribution. In contrast, stimulus variables receiving an intermediate rating such as item number 30, "Considerate," with the rating of 3.13 presents a reasonable distribution across the five points on the rating scale.

It is interesting that the items receiving a rating of 5, "Extremely Important," by one-third or more of the teachers present a picture of a very hard-working, if less than typical, student. He must be industrious, conscientious, reliable, alert, open-minded, thorough, self-controlled, efficient, and emotionally stable. This suggests an

TABLE XV

Student Characterististics and Traits
Rating Form Items Ranked by Value Frequency

Item No.	Trait	Percentage of Teacher Rating Value 5	4	3	2	1	Teacher Mean Value	SD
6	Industrious	52	36	9	3		4.41	.72
30	Conscientious	50	36	12	2		4.42	1.16
21	Reliable	47	35	16	2		4.35	.74
37	Alert	46	39	13	2		4.36	.68
2	Open-minded	42	34	20	3	1	4.16	.88
14	Thorough	33	36	29	2		4.07	.81
22	Self-controlled	31	39	25	5		3.97	.85
7	Efficient	30	43	24	2	1	4.07	.78
11	Emotionally stable	30	37	25	7	1	3.93	.93
32	Flexible	28	36	31	4	1	3.91	.87
10	Purposeful	27	34	36	2	1	3.89	.86
35	Imaginative	25	29	41	5		3.76	.89
9	Insightful	24	37	32	7		3.82	.92
19	Healthy	22	26	42	5	5	3.58	1.06
28	Fair	22	20	39	14	5	3.41	1.14
20	Progressive	19	29	36	12	4	3.47	1.04
23	Sensible	19	36	35	8	2	3.64	.93
25	Punctual	19	33	35	7	6	3.60	1.03
36	Tolerant	17	31	34	14	4	3.38	1.06
31	Learned	16	31	45	3	5	3.46	.96
12	Original	15	26	39	16	4	3.33	1.01
16	Approachable	14	21	49	14	2	3.33	.94
33	Thoughtful	13	26	35	23	3	3.28	1.07
39	Leadership	13	21	31	25	10	3.07	1.16
1	Polite	10	16	57	10	7	3.13	.95
24	Just	10	23	48	13	6	3.20	.99
40	Appearance	10	17	39	19	15	2.87	1.17
3	Considerate	9	17	53	15	6	3.10	.95
29	Firm	8	16	52	19	5	2.98	.88
30	Humorous	6	8	28	38	20	2.39	1.05
17	Pleasant	5	11	46	28	10	2.71	1.00
38	Cheerful	5	18	36	27	14	2.72	1.06
15	Socially Accepted	4	8	31	30	27	2.72	1.04
5	Agreeable	3	12	41	35	9	2.66	.88
8	Sympathetic	3	4	30	32	31	2.06	.86
18	Poised	3	16	36	27	18	2.56	1.00
26	Kind	2	10	39	30	19	2.42	.99
4	Friendly	1	6	41	33	19	2.40	.90
13	Sensitive	1	8	47	27	17	2.49	.94
27	Warm	0	7	30	33	30	2.09	.92

unusually high level of maturity for the student and reflects a common index of our middle-class value system.

At the lower end of this scale a high agreement did not exist on the several stimulus variables. The teacher mean value was 4.41 at the highest end of the scale, while, at the other end, the value ratings were no lower than 2.6. Thus, there was a (1) decided need for a broader range of characteristics, and (2) possible halo effect moving the scale upward almost a whole unit. A symmetrical pattern of the ratings would have placed the lowest five or six stimulus variables in the range of approximately .6 rather than in the range of 2.6.

Conclusion

Viewing those factors teachers have identified as pertinent to academic success, characteristics were not related to achievement in particular subject matter fields. In other words, while English teachers would be expected to be concerned with correctness of expression and address, science teachers might not be; therefore, the characteristics would not be commonly aligned. The fact that a single structure emerged from teachers in general indicates that they are not looking for particular characteristics for

achievement in specific subject matter areas.

The mean values assigned by the teachers to the stimulus variables were high on the rating scale. An analysis of the rankings made by the majority of the teachers suggests that the agreement on the significance of a trait occurred in the areas of lesser importance. Apparently, the variety of teachers cooperating in the rating were not in agreement on the most significant characteristics for academic achievement.

The highest value ratings (5 and 4) assigned by the majority (67 percent or more) of the teachers present an index of the middle-class value system. While assumptions can not be made from these data, certainly the question arises concerning the impact of parochial expectations on teacher behavior, including teacher evaluation.

PART IV

RESULTS AND DISCUSSIONS

The present emphasis upon scholastic achievement has intensified the consequences and the tensions associated with student evaluation and prediction. Critical decisions which affect placement and educational planning in the secondary schools involve academic expectation and social adjustment. Grades and test scores have become real weapons at a time when academic attainment is coming to be more valued than ever before because of the increasing opportunities education affords. Learners who, for one reason or another, are made to think of themselves as stupid must face ego damage as well as the educational limitations involved. In other words, the results of educational decisions are among those variables determining the student's adjustment, performance, morale, and self-concept; therefore, they must be recognized as vital factors shaping the development of personality and influencing mental health.

The adequacy and usefulness of guidance decisions in the public schools depend upon the validity of the criteria established: standardized test scores, teacher

grades, teacher-made test scores, and other records composed of teacher judgment. If these indicators are valid as measures of student achievement in a particular subject matter area, they should correlate highly. Among the ITED subtest scores, the intercorrelations indicated a strong general factor was operating in the measurement of student achievement. Furthermore, the correlation coefficients between English and the other subject matter fields, as was expected, were higher than the correlation coefficients between biology and American history.

The identification of specific ingredients of teacher grades can not be made from this study, but a general factor has been revealed through the statistical analysis of the data as a sizable portion of the total communality. While verbal ability is accepted as the necessary variable in determining as well as evaluating the extent of cognitive development, serious questions are raised about the limited educational opportunities and the impact of academic evaluation and cumulative data interpretation on the self-image, morale, and personality development of students. It is contended that those involved in the critical decision making process which affects student self-perception and aspiration

are not recognizing--much less functioning upon--the limitations of student data as much as they should. The gravity of basing student prediction solely on the scholastic criteria investigated in this study is intensified further by referring to the coefficients of alienation. For example, a correlation coefficient of .40 has only ten chances in one hundred of predicting correctly the relationship between two factors. Several of the correlation coefficients were lower than, or as low as, .25, and none were higher than .79.

Because current studies of mental abilities show the importance of a multiple factor approach, this investigation included several significant data of student achievement and evaluation. If all criteria are reliant as independent measures of student achievement, they should make distinct contributions to those records concerning students. If these data do not add separate and different kinds of information about youth, serious questions must be raised concerning the interpretations and the wisdom of basing critical decisions, such as class placement and educational evaluation and planning, upon them.

While the use of standard scores rather than raw

scores (which were not available) increased the error in the calculations, a statistical analysis of the criteria (the nine subtest scores of the Iowa Tests of Educational Development, teacher grades, teacher-made test scores) used in decision making processes reveals that these data do not unite, and, on the surface, at least, appears to verify that each set of variables are independent measures of student achievement. In other words, the factors clustered among themselves but separated from one another.

Inspection of the factored structures indicates, however, that the conclusions are not readily available through the common techniques of investigation. Plotting the factors which were taken from the varimax rotations best illustrates the fallacy of hasty inferences. The standardized test scores representing the four major subject matter fields (natural science, social studies, language, and arithmetic) load, for the most part, on one variable, best interpreted as a verbal or reading-language factor. While grades and teacher-made test scores in biology, English, and American history did not cluster with one another on the factor plot, there is ample basis to interpret all scores investigated as heavily loaded on a verbal factor with no assurance that this is the same factor reflected in the English grades

earned in the school or the ITED subtests involving the language arts.

In other words, the several variables (test scores and subject matter grades) did not approach a simple structure but gave essentially the same type of information. While it is true that some evidence exists that more than one factor was included in those criteria studied, the analysis was not a simple task nor did the patterns relate well to what was expected.

A list of forty stimulus variables elicited those characteristics teachers said were significant to academic success. Teachers showed a tendency to select factors which indicate a high degree of personal adequacy. Although teachers varied widely in the selection of traits which play an important part in scholastic success, it was found that a majority of them agreed the characteristics were valuable. Perhaps the skewed results might have been prevented had the list included negative traits for clarifying contrasts and/or had the sample of teachers been larger. More than likely, however, the explanation lies in how the teacher perceives himself and his role. One, for example, might be a highly conforming individual, another, very creative. In response

to the value rating, teachers with such disparate personalities would not have the same conception of a successful student, and it is generally accepted that both types of teachers are right.

The results of the questionnaire raised some points worthy of determination, which include the following:

1. Is the idea of identifying particular characteristics as valuable to academic success valid?

2. To what extent is the academically successful student a general characterization described the same way by all teachers?

3. Can this characterization be defined at all?

4. If it can be described, does it make sense in light of other knowledge, for example, needs, life styles, etc.?

In conclusion, the investigation emphasizes the incompleteness of the data used in guidance work involving critical decisions which affect educational placement and planning. With the emphasis today on creativity, leadership, and individual development (physical, mental, and emotional), a thorough investigation must be made of the practices which prevent the attainment of such objectives. Recommendations for counselors and educators who are

instrumental in the critical decision making process include (1) close inspection of standardized tests and their uses within a district, (2) familiarization of school policies affecting education evaluation and placement, (3) careful observation and consideration of teacher judgment and value systems, (4) caution in interpreting student records, and (5) more concern for the situations and forces in public school systems which influence personality development and mental health.

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APPENDIX A

Personnel Data Sheet

and

Student Characteristic

and Trait Rating Form

POSITION DATA

Current position in secondary education. Check the most appropriate response for the academic field represented.

_____ 1. Business-Technical-Vocational Education
_____ 2. English
_____ 3. Fine Arts (art, music, instrument, choir)
_____ 4. Homemaking
_____ 5. Industrial Arts
_____ 6. Languages
_____ 7. Mathematics
_____ 8. Physical Education
_____ 9. Science
_____10. Social Sciences
_____11. Speech, Drama, Debate
_____12. Vocational Agriculture
_____13. Other (please indicate academic field)
_____

Personal Data:

_____Years of experience in education (count present year)

_____Male

_____Female

T-C SCALE 1

INSTRUCTIONS: Given below are 40 adjectives which can be used to describe people. In this case we would like you to use the adjectives to describe the "good student." You should judge each trait as to its importance for the academically successful student to have. Try to be general in your judgments. That is, do not limit yourself to particular subject matter areas, educational goals, or grade levels. In cases of doubt, however, where you feel you must label your good student, think of the public secondary school student you have taught. In other words, we would like to have your considered judgment on HOW IMPORTANT it is for students to have the characteristics or traits for academic success at the secondary level.

Use the following system in judging the traits or characteristics. Rate each item as to its importance to academic success in secondary education by circling the ONE appropriate response. Try to use the whole scale of numbers. Don't, for example, say that a student should have all or most of the traits (by noting high numbers, such as 5 and 4, on all or most of them).

Be as discriminative as you can.

KEY:
5--extremely important
4--very important
3--important
2--unimportant
1--not important at all

VALUE					TRAIT OR CHARACTERISTIC	
5	4	3	2	1	(1)	Polite
5	4	3	2	1	(2)	Open-minded
5	4	3	2	1	(3)	Considerate
5	4	3	2	1	(4)	Friendly
5	4	3	2	1	(5)	Agreeable
5	4	3	2	1	(6)	Industrious
5	4	3	2	1	(7)	Efficient
5	4	3	2	1	(8)	Sympathetic
5	4	3	2	1	(9)	Insightful
5	4	3	2	1	(10)	Purposeful
5	4	3	2	1	(11)	Emotionally stable
5	4	3	2	1	(12)	Original
5	4	3	2	1	(13)	Sensitive
5	4	3	2	1	(14)	Thorough
5	4	3	2	1	(15)	Socially accepted
5	4	3	2	1	(16)	Approachable
5	4	3	2	1	(17)	Pleasant
5	4	3	2	1	(18)	Poised
5	4	3	2	1	(19)	Healthy
5	4	3	2	1	(20)	Progressive
5	4	3	2	1	(21)	Reliable
5	4	3	2	1	(22)	Self-controlled
5	4	3	2	1	(23)	Sensible
5	4	3	2	1	(24)	Just

(Continued on next page)

VALUE					TRAIT OR CHARACTERISTICS	
5	4	3	2	1	(25)	Punctual
5	4	3	2	1	(26)	Kind
5	4	3	2	1	(27)	Warm
5	4	3	2	1	(28)	Fair
5	4	3	2	1	(29)	Firm
5	4	3	2	1	(30)	Conscientious
5	4	3	2	1	(31)	Learned
5	4	3	2	1	(32)	Flexible
5	4	3	2	1	(33)	Thoughtful
5	4	3	2	1	(34)	Humorous
5	4	3	2	1	(35)	Imaginative
5	4	3	2	1	(36)	Tolerant
5	4	3	2	1	(37)	Alert
5	4	3	2	1	(38)	Cheerful
5	4	3	2	1	(39)	Leadership
5	4	3	2	1	(40)	Appearance

APPENDIX B

Sample Data from Student Subtest Scores and Teacher Grades and Test Scores Form

CODE	#1	#2	#3	#4	#5	#6	#7	#8	#9	BIOLOGY				ENGLISH				AMERICAN HISTORY			
										19W	29W	FE	FA	19W	29W	FE	FA	19W	29W	FE	FA

APPENDIX C

Correlation Coefficients

21 Variables

CORRELATION MATRIX OF SCORES ON THE SUBTESTS OF THE IOWA TESTS OF EDUCATIONAL DEVELOPMENT AND TEACHER-MADE TESTS AND GRADES IN BIOLOGY, ENGLISH AND AMERICAN HISTORY*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1																					
2	74																				
3	62	46																			
4	65	60	58																		
5	72	60	66	58																	
6	71	65	64	64	75																
7	70	60	70	60	76	74															
8	76	64	70	58	72	73	79														
9	78	63	73	69	72	73	76	78													
10	39	46	22	26	31	35	30	33	23												
11	37	48	22	25	29	36	31	35	28	77											
12	28	43	17	22	20	28	22	25	21	60	72										
13	39	51	23	28	30	37	30	35	27	85	95	83									
14	33	34	19	21	27	32	25	30	22	63	63	50	66								
15	38	38	24	26	31	36	31	36	28	65	68	53	70	72							
16	36	38	24	21	31	33	26	32	25	52	56	51	60	54	66						
17	42	42	26	25	34	37	32	37	28	69	71	58	75	83	93	78					
18	51	42	32	29	38	40	39	42	34	62	62	49	65	62	74	61	77				
19	50	40	32	28	32	37	36	41	32	56	59	47	61	56	66	55	69	81			
20	45	34	29	24	26	31	31	35	29	46	49	43	51	46	52	46	55	68	77		
21	53	41	33	30	35	38	37	42	35	60	62	50	65	61	70	59	74	89	96	85	

*Decimals have been omitted.

APPENDIX D

Correlation Coefficients

40 Variables

Correlation Coefficients of Student Characteristics and Trait Rating Charts*

Variable	1	2	3	4	5	6	7	8	9	10
1										
2	05									
3	69	-05								
4	53	-02	60							
5	48	-12	58	57						
6	07	10	-00	06	20					
7	08	22	-04	05	11	36				
8	41	12	43	46	37	07	02			
9	-16	38	-23	-19	-22	11	14	-05		
10	04	13	10	16	21	43	36	21	16	
11	24	-06	20	12	19	13	30	03	-05	12
12	-18	24	-19	-07	-27	09	07	-07	30	19
13	08	18	22	12	02	06	-03	37	16	23
14	-02	11	-11	-19	02	41	35	-15	-09	21
15	29	01	30	52	27	05	06	36	-06	15
16	18	13	19	06	27	08	11	12	02	11
17	44	-05	53	60	59	10	10	48	-16	16
18	37	03	30	52	24	12	14	26	07	05
19	19	11	12	13	20	20	16	14	19	-02
20	15	10	08	07	08	26	16	08	11	21
21	36	-06	26	22	24	41	11	17	03	23
22	40	-02	37	31	32	28	26	04	-21	06
23	18	14	22	06	14	26	19	08	23	10
24	38	07	48	30	26	05	-03	28	09	11
25	44	02	46	27	41	09	23	04	-17	10
26	48	04	67	55	41	-03	-05	62	-09	16
27	45	09	57	57	46	07	-12	60	-12	15
28	39	07	52	33	33	06	11	35	-02	23
29	16	12	29	10	08	-00	16	27	16	21
30	12	07	17	09	24	31	27	04	12	29
31	-04	07	-16	-21	-09	16	32	-28	12	19
32	00	36	07	-04	09	06	04	07	13	23
33	27	20	37	19	19	-02	00	37	19	03
34	23	17	43	45	34	05	-13	52	-18	21
35	-09	20	-05	-05	-08	14	27	-09	32	33
36	45	08	49	38	42	03	14	25	-02	14
37	-03	19	-07	-14	-05	31	31	-16	28	30
38	40	-03	51	52	34	-05	-06	25	-08	07
39	41	-02	45	41	26	05	12	11	-07	10
40	50	-10	49	44	40	04	-02	16	-26	-00

*Decimals have been omitted

Correlation Coefficients of Student Characteristics and Trait Rating Charts* (Continued)

Variable	11	12	13	14	15	16	17	18	19	20
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12	-22									
13	-01	20								
14	20	-04	-07							
15	27	-10	04	-08						
16	19	-13	-04	19	25					
17	16	-01	20	-10	49	17				
18	27	-08	10	-06	48	09	29			
19	29	-05	03	09	28	31	05	35		
20	08	15	13	06	22	19	23	13	21	
21	18	-13	03	27	19	19	12	27	16	21
22	36	-13	02	29	21	12	32	15	18	06
23	21	05	-02	16	06	16	16	20	05	07
24	30	-13	22	-03	16	20	37	18	18	26
25	42	-30	-08	20	22	26	36	32	18	02
26	18	-11	27	-21	34	08	59	35	04	07
27	08	-13	21	-24	37	10	55	40	14	18
28	20	-13	27	-05	12	23	30	14	22	26
29	19	19	22	-04	09	20	14	23	24	22
30	24	08	04	22	11	11	14	02	08	21
31	25	-03	-12	18	-01	-05	-10	02	12	13
32	05	15	15	23	-14	41	-02	-10	14	06
33	04	01	17	-10	11	11	28	23	18	-08
34	07	02	26	-04	35	21	39	26	02	-08
35	11	56	20	05	-07	-04	-03	02	07	15
36	18	-02	25	04	17	15	41	16	17	26
37	32	09	11	42	02	19	-05	08	15	08
38	24	11	17	-10	43	08	52	51	17	-03
39	13	12	14	-10	28	-06	34	40	08	28
40	29	-20	-06	-10	39	19	33	33	20	34

*Decimals have been omitted

Correlation Coefficients of Student Characteristics and Trait Rating Charts* (Continued)

Variable	21	22	23	24	25	26	27	28	29	30
1										
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21										
22	32									
23	33	33								
24	26	41	33							
25	23	40	23	34						
26	19	23	15	51	42					
27	17	16	14	39	23	74				
28	33	32	16	58	34	52	40			
29	07	11	10	31	22	32	25	43		
30	35	25	31	13	27	05	-03	30	08	
31	-10	17	17	05	03	-22	-18	-01	14	-00
32	-03	06	10	11	02	-03	04	20	19	12
33	08	02	23	25	26	48	37	22	24	05
34	20	09	10	14	16	54	55	33	11	08
35	07	02	23	-00	-07	-07	-07	02	22	17
36	19	27	03	33	37	42	31	46	15	27
37	36	12	22	06	16	-10	-13	-04	11	30
38	11	25	18	23	43	51	48	22	21	20
39	17	08	10	21	34	34	40	34	25	13
40	32	25	-01	30	43	37	37	36	20	06

*Decimals have been omitted

Correlation Coefficients of Student Characteristics and Trait Rating Charts* (Continued)

Variable	31	32	33	34	35	36	37	38	39	40
1										
2										
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32	-01									
33	-24	04								
34	-20	20	23							
35	16	22	01	08						
36	-14	23	10	23	04					
37	29	32	08	07	27	13				
38	-19	-05	33	43	06	36	03			
39	09	-04	08	16	22	46	01	45		
40	01	-09	06	19	-07	50	-03	41	51	

*Decimals have been omitted